G-Mouse GPS Receiver

GMR75

User Manual

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Usage Notice

Please read before you start to use the GPS receiver:

- GPS(Global Position System) is found and operated by US Department of defense. The Organization is responsible for accuracy and maintenance of the system with full authority. Any change that is made by the organization will affect accuracy and function of GPS.
- For your driving security, we strongly suggest that you do not operate the device during driving.
- When satellite is navigating, if you are inside a building, tunnel or near huge blocks, it will affect GPS satellite signal receiving. At this time, this device probably dose not have positioning capability.
- If you have a speed alarm in your car, the signal receiving of this device will be interfered. If this situation happens, please stop using your speed alarm.
- The receiver operating temperature is located between -40℃ ~ +85℃.For safety and lifetime of Li-ion battery usage, do not place this device over two hours with overheated environment.

0. Quick Start

0.1 Check the package

A. Standard pack

G-Mouse MR (GPS receiver, including magnet pad), disc and quick use manual

B. Optional accessory

To collocate with different kinds of computers and handset devices, G-Mouse MR GPS receivers you purchase may include different accessories as below:

1. Computer connector
2. Software (navigation or special software)
3. Other software/hardware

0.2 Check the connector

A.PS/2 to USB adapter. Before connecting, please refer to Chapter 4: Install the driver from the CD-Rom.

PS/2 to USB

0.3 Connect to your equipment

A. Connect the G-Mouse MR to your equipment

B. Put G-Mouse MR in a appropriate place to receive the best GPS satellite signal.

C. Turn on your equipment (or switch the handhold device on)

D. Your G-Mouse MR will start to provide you GPS satellite positioning function.

1. Introduction

1.1 Introduction

G-Mouse MR is a total solution GPS receiver (G-MR instead below), designed based on most high sensitivity MediaTek kernel architecture. This positioning application meets strict needs such as car navigation, mapping, surveying, security, agriculture and so on. Only clear view of sky and certain power supply are necessary to the unit. It communicates with other electronic utilities via compatible dual-channel through RS-232 or TTL and saves critical satellite data by built–in backup memory. With low power consumption, the G-Mouse tracks up to 32 satellites at a time, re-acquires satellite signals in 1 sec and updates position data every second. 4 power-saving mode allows the unit operates with ultra low power request.

1.2 Features

G-MR provides a host of features that make it easy for integration and use.

1. Use the most advantage GPS module (MediaTek), the module got high performance CPU inside(ARM CPU), allow users to design different applications, store in the module, to provide the most economic solution for anybody.
2. High performance receiver tracks up to 32 satellites while providing first fast fix and low power consumption.
3. Compact design ideal for applications with minimal space.
4. A rechargeable battery sustains internal clock and memory. The battery is recharged during normal operation.
5. Auto switch-able power saving mode 1~4, reduce your power exhaust.
6. User initialization is not required.
7. Optional communication levels, RS-232 and TTL meet ordinary application and new fashions of connecting PDA with TTL or RS-232 output.
8. FLASH based program memory: New software revisions upgradeable through serial interface.
9. LED display status: The LED provides users visible positioning status. LED "Blinking" when power connected and "On" when G-Mouse got positioned.
10. Industry level water proof design for all weather.

1.3 Technical Specification

1.3.1 Dimension

Single construction integrated antenna/receiver.

Size: 60.0 (L) x 54.0 (W) x 27.0 (H) (mm)。

2.36 (L) x 2.13 (W) x 1.06 (H) (Inch)。

1.3.2 Environmental Characteristics

1) Operating temperature: -40℃ ~ +85℃ (internal)。

2) Storage temperature: -50°C ~ 90°C

1.3.3 Electrical Characteristics

1) Input voltage: +4.75~+5.5V DC

1.3.4 Performance

1) Tracks up to 32 satellites.

2) Update rate: 1Hz.

3) Acquisition time (average)

Hot start: 1 sec

Warm start: 36 sec

Cold start: 37 sec

4) Position accuracy:

A) None DGPS (Differential GPS)

Position: < 3m CEP (50%) without SA (horizontal)

Time: 0.1 ms synchronized GPS time

B) DGPS (Differential GPS)

Position: <2.5m

5) Dynamic Conditions:

Altitude: 18,000 m (60,000 feet)max

Velocity: 515 m/sec (700 knots)

Acceleration: 4G max

1.3.5 Interfaces

1) Dual channel RS-232 or TTL compatible level, with user baud rate 9600 bps.

2) NMEA 0183 Version 3.01 ASCII output (Default：GGA,GSA,GSV,RMC,VTG,CHN).

2. Operational Characteristics

2.1 Initialization Setup

After the initial self-test is complete, the G-MR will begin the process of satellite acquisition and tracking. The acquisition process is fully automatic and, under normal circumstances, will take approximately 37 seconds to achieve a position fix (36 seconds if ephemeris data is know). After a position fix has been calculated, valid position and time information will be transmitted over the output channel(s).

The G-MR utilizes initial data such as last stored position, data and time as well as satellite orbital data to achieve maximum acquisition performance. If significant inaccuracy exists in the initial data, or if the orbital data is obsolete, it may take a long time to achieve a navigation solution. The G-MR Auto-locate feature is capable of automatically determining a navigation solution without intervention from the host system. However, acquisition performance can be improved if the host system initialized the G-mouse following the occurrence of one or more of the following events:

1) The GPS receiver is not in use for more than 3 months or transportation over distances further than

500 kilometers.
2) Power off the PDA main power without system standby power.

2.2 Navigation

After the acquisition process is complete, the G-MR will begin sending valid navigation information over its output channels. These data include:
1) Latitude/longitude/altitude
2) Velocity
3) Date/time
4) Error estimates
5) Satellite and receiver status

3、Hardware Specification

3.1 Outline

Size: 60.0 (L) x 54.0 (W) x 27.0 (H) (mm)。
2.36 (L) x 2.13 (W) x 1.06 (H) (Inch)。

3.2 Hardware Interface

The G-MR intelligent satellite receiver, includes GPS receiver and an antenna in a unique style gadget. Simply connect PS-2 male connector to one of the accessories linking to your notebook PC, PDA or other devices. Optional color, input voltage and output connector are listed and described bellow:

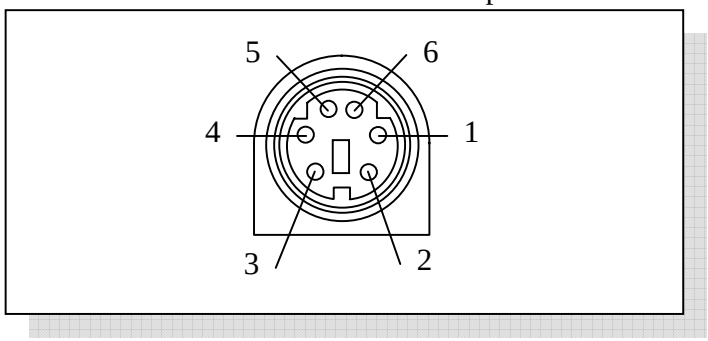
G-Mouse MR

PS/2 to USB adapter

PS：The picture only supplies the reference, please depend on the actual product.

3.3 Output Connector

Cable length: 2 meter, Connector: PS/2 female.
Function definition of PS-2 female composite connectors.



Pin	Signal	
	RS-232+TTL	RS-232
1	TX(RS232)	Tx
2	+5V DC	+5V DC
3	Tx(TTL)	NC
4	Ground	Ground
5	Rx(TTL)	DGPS in
6	RX(RS232)	Rx

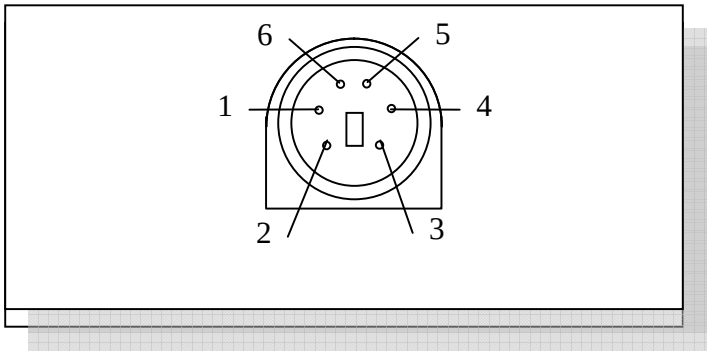
3.4 Accessories

In order to connect with different system, we provides several kinds of connectors to choose as following:

3.4.1 PS/2 connector definition:

Pin	Signal Name
1	+5V
2,3,5,6	N.C
4	Ground

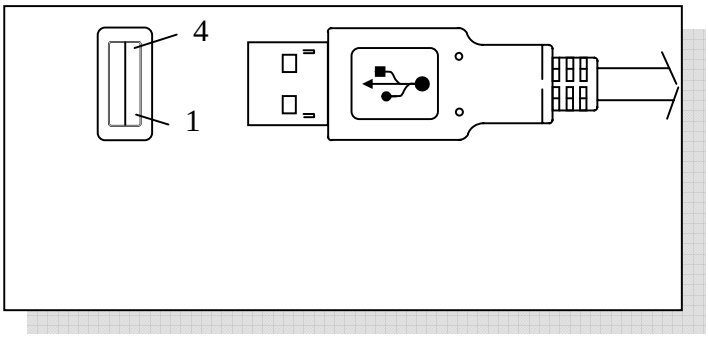
N.C. :Not connection



3.4.2 USB connector

The USB type：A type

Pin	Signal Name
1	+5V
2	D+
3	D-
4	Ground



3.4.3 Magnetic plate (Concurrently fixed stand)

The magnetic plate, a standard equipment, has been put in the G-MR base on delivery, can be put on the car roof, the boat roof or the other brace and face to the sky.

4、G-Mouse USB Adapter Driver

4.1 System requirement

PC: IBM, Pentium or above or compatible PC。
Memory: 16MB or above。
Operation system: Windows 98/Me/2000/2000XP
Display card: VGA compatible.

4.2 Install USB Driver

1) Insert the CD-ROM: [GPS Driver&Manual] into the CD drive. Please make sure that the auto-play function is enabled!

2) Please follow the screen guide and click [Install/Remove G-Mouse Device Driver]

3) Please follow the screen to install the USB driver. Maybe it is necessary to reboot PC, please reboot as it says.

4) Insert the G-MR USB connector into any empty USB slot, now your PC will recognize the USB device automatically. You may use the G-MR freely now.

4.3 Verify the Driver Installation

Please identify the COM port ID after you install the G-MR USB driver:

1) Click [Start], [Setup], and click the [Control Panel].

2) While the windows of [Control Panel] shows up, double click the [System], [Hardware] and click the button [Device Manager]. Expend the tree node [Ports(COM&LPT)], you should see the item [Prolific USB-to Serial Comm Port (COM#)]. If so, it means you can use G-MR correctly now.

3) The "#" mark means the COM port ID simulated by the USB adapter. Most of the GPS navigate software use COM1 as default settings. You should change it to the corresponding port ID mapped by the USB adapter, and G-Mouse can report GPS message correctly.

5. Warranty

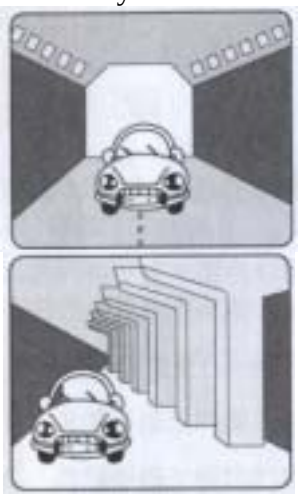
The G-MR is warranted to be free from defect in materials and functions for one year from the date of purchase. Any failure of this product within the period under normal conditions will be replaced at no charge to the customers.

This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alteration or repairs, inappropriate disassemble.

6. Trouble Shooting Guide

6.1 Satellite Signal Problem

It is normal if you found that the GPS satellite signal very low or absolute missing:



- While you are in a tunnel, GPS signal isolated.
- There is something cover above, GPS signal isolated.

➢ Inside of the building, GPS signal isolated.

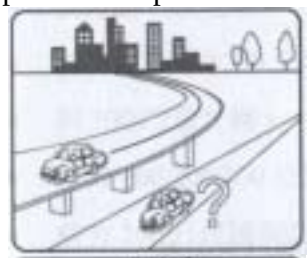
➢ Buildings near by, GPS signal interfered.

➢ Inside the forest, lots of covers above, GPS signal level down.

- If you use G-MR inside the car, some sun-control film will makes the GPS signal low or lost.
- GPS satellite is owned by America army, sometimes they will tune-down the accuracy by some reason. In such cases, the GPS position may not fixed exactly.

6.2 Position Fixing Problem

The position fix problem below does not mean the G-MR GPS receiver's malfunction:



➢ You are driving on the freeway, but the GPS navigation software shows you are on the road beside. Or the opposite situation.

➢ You are driving on a grid like lane, it is possible to show your car on an incorrect lane, if these 2 lane very near.

➢ If you translate the GPS receiver inside somewhere with no satellite signal, the GPS position may stay at the position before.

6.3 GPS Not Fix Problems

If you see [GPS not Fix] message on the screen after you enable the G-MR GPS receiver, please consider the possibility below:

- Please wait few minutes more. GPS position fix may cost several minutes.
- Please make sure that you put the G-MR GPS receiver at a proper place. Some sun-control film for car may cutoff the satellite signal. You may replace it and try again.

Please make sure that you are not inside of somewhere the GPS signal shaded. Please reference the chapter [Satellite Signal Problem] about this.

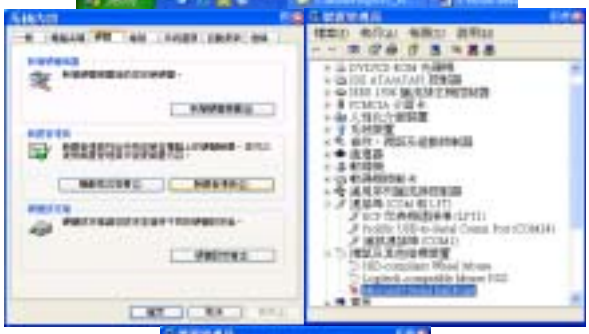
6.4 G-Mouse Driver Confliction Problem

If you notice that the PC's mouse cursor is in panic, or you just can't find GPS device in your GPS navigation software, please follow the steps below to check:

1) Please disconnect the G-MR and the adapter in your package, but leave the adapter connected to your USB slot.

2) Click [Start], [Setup], and click the [Control Panel].

3) After the window of [Control Panel] shows up, double click [System], [Hardware], and click [Device Manager]. Expand the tree node [Ports (COM & LPT)], see if something like [Microsoft Serial BallPoint] or [Microsoft Serial Mouse] there.



4) Right click on it and select [Disable].

5) Re-connect the G-MR and your accessory, the G-MR will back to work normally now.

Appendix A Software Protocol

The protocol of G-MR is designed base on NMEA(National Marine Electronics Association) 0183 ASCII format. The full protocol is defined in "NMEA 0183, Version 3.01".

A.1、NMEA Transmitted Message

G-MR GPS receiver use MediaTek as the core, and output NMEA-0183 standard format message. The default communication parameters for NMEA output are 9600 baud, 8 data bits, stop bit, and no parity.

Table **A-1 NMEA-0183** Output Messages

NMEA Sentence	Description
GPGGA	Global positioning system fixed data
GPGLL	Geographic position latitude \ longitude
GPGSA	GNSS DOP and active satellites
GPGSV	GNSS satellites in view
GPRMC	Recommended minimum specific GNSS data
GPVTG	Course over ground and ground speed
GPZDA	Data and Time

A.1.1 Global Positioning System Fix Data (GGA)

Samples:

$GPGGA,161229.487,3723.2475,N,12158.3416,W,1,07,1.0,9.0,M, , , ,0000*18

Table **A-2 GGA** Data Format

Name	Description	Units	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	161229.487		Hhmmss.sss
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N = north or S = south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E = east or W = west
Position Fix Indicator	1		See Table4-3
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude	9.0	Meters	
Units	M	Meters	
Geoid Separation		Meters	
Units	M	Meters	
Age of Diff. Corr.		Second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		

Table **A-3** Position Fix Indicator

Value	Description
0	0 Fix not available or invalid
1	GPS SPS Mode fix valid
2	Differential GPS, SPS Mode fix valid

Value	Description
3	GPS PPS Mode fix valid

A.1.2 Geographic Position - Latitude/Longitude (GLL)

Samples:

$GPGLL,3723.2475,N,12158.3416,W,161229.487,A*2C

Table **1-4** GLL Data Format

Name	**Example**	**Units**	**Description**
Message ID	$GPGLL		GLL protocol header
Latitude	3723.2475		dd mm.mmmm
N/S Indicator	N		N = north or S = south
Longitude	12158.3416		ddd mm.mmmm
E/W Indicator	W		E = east or W = west
UTC Position	161229.487		hh mm ss.sss
Status	A		A = data valid or V = data not valid
Checksum	*2C		

A.1.3 GNSS DOP and Active Satellites (GSA)

Samples:

$GPGSA,A,3,07,02,26,27,09,04,15, , , , , ,1.8,1.0,1.5*33

Table **A-5 GSA** Data Format

Name	**Example**	**Units**	**Description**
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table 4-6
Mode 2	3		See Table 4-7
Satellite Used *1	07		SV on Channel 1
Satellite Used *1			SV on Channel 2
…..			…...
Satellite Used *1			SV on Channel N
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		

*1 Satellite used in solution.

Table **A-6** Mode 1

Value	**Description**
M	Manual – forced to operate in 2D or 3D mode
3	Automatic – allowed to automatically switch 2D/3D

Table **A-6** Mode 2

Value	**Description**
1	Fix Not Available
2	2D
3	3D

A.1.4 GNSS Satellites In View (GSV)

Samples:

$GPGSV,2,1,07,07,79,048,42,02,51,062,43,26,36,256,42,27,27,138,42*71
$GPGSV,2,2,07,09,23,313,42,04,19,159,41,15,12,041,42*41

Table **A-8 GSV** Data Format

Name	*Example*	*Units*	*Description*
Message ID	$GPGSV		GSV protocol header
Number of Messages1	2		Range 1 to 3
Message Number 1	1		Range 1 to 3
Satellites in View	07		Range 1 to 12
Satellite ID	07		Channel 1 (Range 1 to 32)
Elevation	79	degrees	Channel 1 (Maximum 90)
Azimuth	048	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
…..	……		
Satellite ID	27		Channel 4 (Range 1 to 32)
Elevation	27	degrees	Channel 4 (Maximum 90)
Azimuth	138	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		

NOTE: Item <4>,<5>,<6> and <7> repeat for each satellite in view to a maximum of four (4) satellite per sentence. Additional satellites in view information must be sent in sentences. These fields will be null if unused.

A.1.5 Recommended Minimum Specific GNSS Data (RMC)

Samples:
$GPRMC,161229.487,A,3723.2475,N,12158.3416,W,0.13,309.62,120598, ,*10

Table **A-9 RMC** Data Format

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Position	161229.487		Hh mm ss.sss
Status	A		A = data valid or V = data not valid
Latitude	3723.2475		dd mm.mmmm
N/S Indicator	N		N = north or S = south
Longitude	12158.3416		ddd mm.mmmm
E/W Indicator	W		E = east or W = west
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	True
Date	120598		dd mm yy
Magnetic Variation1	02.6	degrees	
E/W Indicator	W		E = east or W = west
Checksum	*10		

A.1.6 Course Over Ground and Ground Speed (VTG)

Samples:
$GPVTG,309.62,T, ,M,0.13,N,0.2,K*6E

Table **A-10 VTG** Data Format

Name	Example	Unit	Description
Message ID	$GPVTG		VTG protocol header

Course	309.62	Degrees	Measured heading
Reference	T		
Course		Degrees	Measured heading
Reference	M		Magnetic[*1]
Speed	0.13	Knots	Measured horizontal speed
Units	N		
Speed	0.2	Km/hr	Measured horizontal speed
Units	K		Kilometer per hour
Checksum	*6E		

Note [*1]:All "course over ground" data are geodetic WGS84.

A.1.7 Time & Date (ZDA)

Samples:

$GPZDA,114523.62,12,04,2001,10,34*6E

Table **1-11** ZDA Data Format

Name	Example	Units	Description
Message ID	$GPZDA		ZDA protocol header
Hour, Min, Sec, Sub Sec	114523.62		Hhmmss.ss
Day	12		day in UTC, 01 to 31
Month	4		month in UTC, 01 to 12
Year	2001		year in UTC
Local Zone Hours	10		local zone hours, +/- 13 hours
Local Zone Minutes	34		local zone minutes, 0 to +59
Checksum	*6E		

Appendix B Coordinate System and Output Settings

B.1 Coordinate System

World standard coordinate system WGS84 is builds in.

B.2 Output Settings

Coordinate System: WGS84。

Baud rate: 9600

Output message: GGA, GSA, GSV, RMC, VTG,CHN